IABAM & PAHILELE COMMUNITY BASED RESOURCE

MONITORING PROGRAM SURVEY REPORT #: 3

MONITORING PERIOD: JUNE 2011

June 2013

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Iabam & Pahilele Community Based Resource Monitoring Program
Survey Report #: 3
Monitoring Period: June 2011

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3

IABAM & PAHILELE COMMUNITY BASED RESOURCE MONITORING PROGRAM

SURVEY REPORT #: 3
MONITORING PERIOD: June 2011

Iabam-Pahilele monitoring team in preparation for monitoring & samples of biological diversity inside their CMMA

MONITORING REPORT WRITTEN BY
Wellington Wamula (*Iabam-Pahilele CMMA Data Specialist*) and Edited by NOEL WANGUNU (*Conservation International*)

PREFACE

Welcome everyone to this 3 monitoring report for the Jabam & Pahilele CMMA. In this report I firstly would like to sincerely thank my fellow monitoring counterparts who have participated in this monitoring period. This monitoring period was a great challenge compared to the other two monitoring period. Rough seas and strong winds driven by the southeast trade winds further deteriorated sea condition through poor water visibility and cold water temperatures which affected a number of individuals in the monitoring team. Despite these experiences, I again congratulate each member of the team who has participated in this monitoring period.

Secondly, I would like to commend those participants who have joined the team for the first time. You have contributed a lot and I believe your continue participation will only bring about a strong monitoring team and support for any new persons who wish to join the team in the next monitoring period which will be in September this year.

Lastly, I would like to extend my sincere thanks on behalf of the monitoring team and the community of Jabam and Pahilele to Conservation International for their time and commitment in ensuring our community is given this privilege to know and monitor our resources so that we know what is happening in our seas as we continue to use and manage what we have.

Chairman Jabam & Pahilele CMMA
Mr. Terry Abaijah

About this report

This report and the coming reports shall be provided using the format outlined below. This format will always be used so that readers shall become accustomed to what each sections area presenting in the report. It is also important to have a standardized format so that it is easier to describe and compare results between different monitoring programs.

1. Introduction
2. Methods
2.1. Field Data collection
2.2. Data analysis
3. Results
3.1. Benthic substrate (i.e. live coral cover and abiotic substrate found inside no-take and at sites outside no-take where monitoring is conducted inside the 500m2 transact
3.2. Monitoring reef fish groups used as indicators for many other fishes that fall inside the broad categories of Herbivore fishes, carnivore fishes and fish species with global importance (eg. Humphead Maori Wrasse)
3.3. Marine invertebrates like
3.3.1. Sea cucumber
3.3.2. Giant clam
3.3.3. Other marine invertebrates like trochus shell, lobster and crown of thorn starfish
4. Discussion. This section will provide possible explanations of what the results are and further make comparison with previous reports (e.g. December 2010 monitoring report, March monitoring report etc.)
4.1. Benthic substrate
4.2. Reef fish indicators
4.3. Marine invertebrates
5. References used in writing up this report.

With that I hope you a pleasant reading and should you have any questions or queries regarding any findings in this report, please do not hesitate to talk to me (Willington Wamula) or my supervising biologist (Noel Wangunu, CI-Alotau)

1. INTRODUCTION

This monitoring report presents the findings for the June resource monitoring program for Iabam and Pahilele community managed marine area (IPCMMA). Similar to December 2010 and March 2011 monitoring report, this report presents the findings from the June monitoring program. It also provides simple comparisons between each monitoring and discusses factors that influence these results.

Analyzed results from this June monitoring program showed similar pattern in distribution of fish, sea cucumber, giant clams and the amount of live coral cover contained in each of the monitoring stations inside no-take (NT sites) and in sites located outside of no-take (OT sites). Some observed changes noted for the monitoring stations and for other areas not sampled by 500 m2 transacts are highlighted below.

1. Luluwalgena (NT.2) recorded the highest average populations for herbivore and carnivore (14 herbivore and 14 carnivore per 500m^2 sampling area) in the March while in this monitoring, we found that Tawali Namonamo (NT.1) recorded the highest counts for both herbivore and carnivore fishes (13.4 herbivore and 14.5 carnivore fishes per 500m^2 monitoring transact. Other areas having second and third fish abundance in this monitoring include Banibani Siga (NT.6) and Siasialina (NT.4) where in March, Siasialina record the second highest and Banibani Siga recorded the third highest averages in the population of herbivore and carnivore fishes.

2. Distribution of sea cucumber appeared similar to the results from March assessment where Dana Gedu (NT.3) contained high counts per 500m^2 monitoring transacts. Areas outside no-take indicated an increase in the number of individuals in the family Bohadschia sea cucumber when compared to the results from March. Average population counts for Holothura remained unchanged in both study periods where, Dana Gedu (NT.3) recorded high averages in both surveys.

3. Results for other invertebrates including giant clam, rock lobster and trochus remained low in all monitoring sites inside no-take and outside no-take.

4. Results for live coral continue to be dominant in many monitoring stations outside no-take. Many stations inside no-take recorded high bedrock substratum and dead coral rubble inside their monitoring areas.

5. Crown-of-thorn starfish (COT) population continues to show increase over the 3 month period.

Other than that, there are also many new discoveries and findings between the two monitoring programs which you shall find out as you continue to read through this report.

2. METHODS

2.1. Field Data Collection

The June 2011 monitoring program was conducted between the 8th and the 13th of June 2011. The survey methods used are the same as that described for December and March monitoring. (*Please refer to those reports for the specifications*)

Table 1. Monitoring stations inside and outside no-take for Nuakata CMMA

Reef Code	Reefs inside Conservation Area (No-Take Zone)	Reef Code	Reefs outside conservation (no-take areas)
NT.01	Tawali Namonamo	OT.01	Iabam (NW)
NT.02	Luluwalagena	OT.02	Iabam (SE)
NT.03.	Dana Gedu	OT.03	Pahilele (SE)
NT.04	Siasialina	OT.04	Tawali Balabala
NT.05	Hanakubakuba Island	OT.05	Manikutu
NT.06	Banibwani Sina	OT.06	Kiwakiwalina

Equipments and logistics used by the Iabam and Pahilele monitoring team include;

1. 1 x dinghy (40hsp)
2. 11 x set of snorkeling gears (kept by CI-Alotau Office)
3. 1 x GPS (recording coordinates for transacts)
4. 1 x 100 meter fiber glass tape measure
5. 1 x Underwater Digital Camera (kept by CI-Alotau Office)

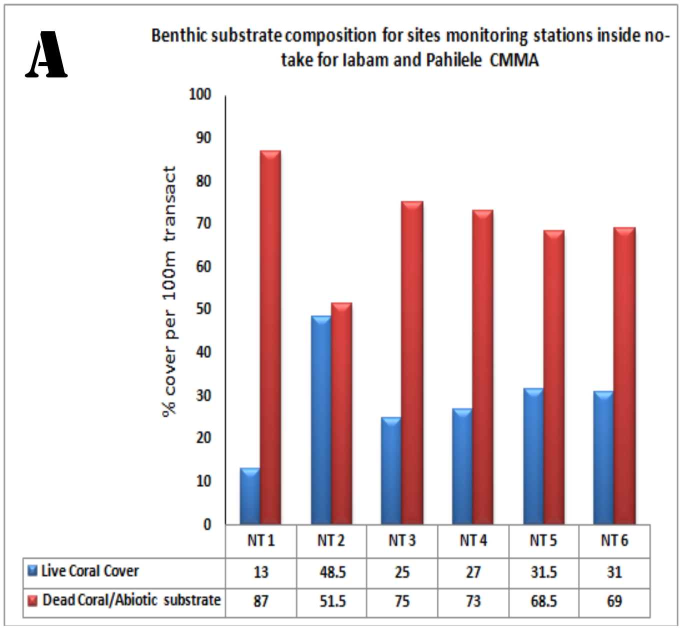
2.2. Data analysis

All data gathered during each day's monitoring were tallied for each organism and entered into printout copies of the substrate, fish and invertebrate datasheet. These data was then transferred into a Microsoft excel spreadsheet database where further analysis were done for coral substrate, fish and invertebrates; generating graphs and the results summarized in Section 3 of this report.

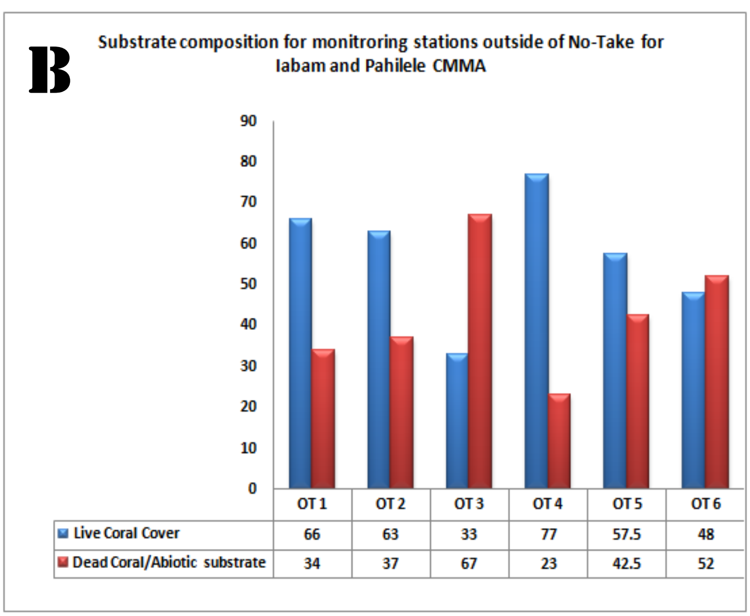
Fig. 1. Sample of excel spreadsheet used as monitoring database.

3. RESULTS

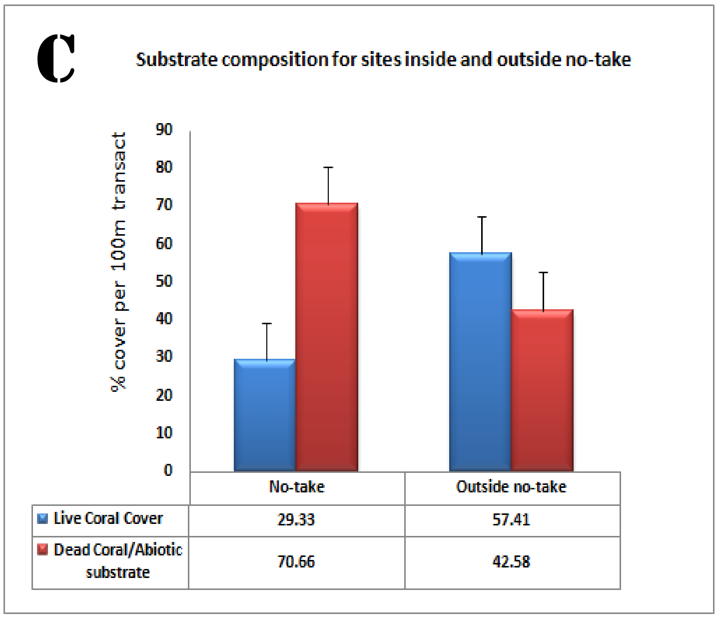
3.1. Benthic substrate for reefs inside no-take and reefs outside no-take areas.



Live coral cover for all 6 monitoring stations inside no-take showed low live coral cover. Luluwalagena (NT.2) was the only site to have 48.5% live corals inside its 100 meter transact while Hanakubakuba Island (NT.5), Banibani Siga (NT.6) had 31.5% each. Other no-take monitoring stations have low coral cover as shown in the graph above. Tawali Namonamo (NT.1) showed high dominance of dead and abiotic substrate with 87% of its 100m transact recording dead coral rubble (86%) and rock (62%) substratum. Live coral cover in this monitoring area constitutes only 13% and were from Acropora branching corals. The other stations with high abiotic substrate dominance were Dana Gedu (75%), Siasialina (73%), Banibani Siga (69%) and Hanakubakuba (68.5%). The large abiotic substrate of Tawali Namonamo, Siasialina, Hanakubakuba and Banibani Siga comprised entirely of dead coral rubble where 86%, 94%, 80% and 78% for each sites respectively. Abiotic substrate for Luluwalagena and Dana Gedu were hard bedrock substrate which 72% was for Luluwalagena and 92% was recorded for Dana Gedu reef.

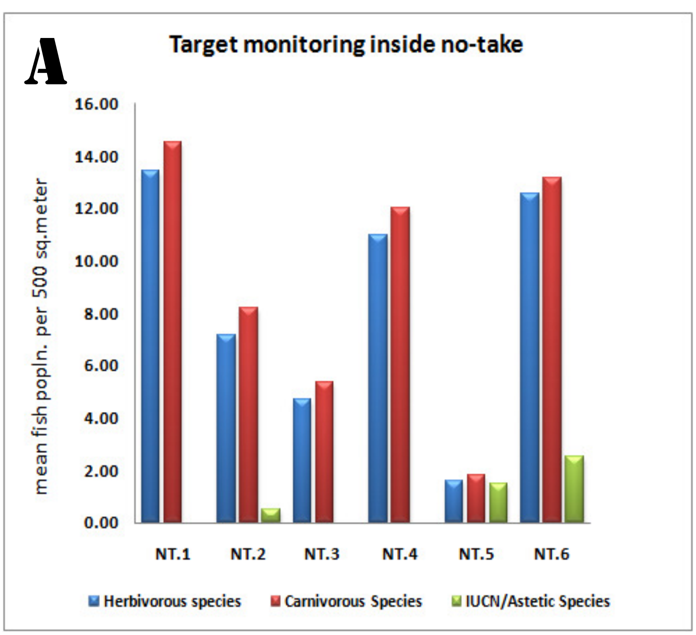


Live coral cover for monitoring stations outside no-take was 67% which was a lot more in the 100m sampling transact than that recorded for monitoring stations inside no-take. Northwestern end of Iabam's fringing reefs recorded 66% live corals where 56.5% of these were soft corals of *Sarcophyton* and *Sinularia* species. Iabam's southeast fringing reef comprised 63% live corals which 43% were also made up of the same two soft corals mentioned earlier. Tawali Balabala housed the highest live coral cover with 77% from the 100 meter transact which was made up of 70.5% *Acropora* branching corals. Manikutu reef contained 57.5% live corals where 88% were branched corals of Acropora and Pocillopora species. Furthermore, the southeastern reef off Pahilele Island was the only monitoring area to record the lowest live coral cover, and high dead coral and abiotic substrate. This area comprised 67% abiotic substrate where 48.5% was made up of hard bedrock and 18% were scattered fragments or dead coral rubble.

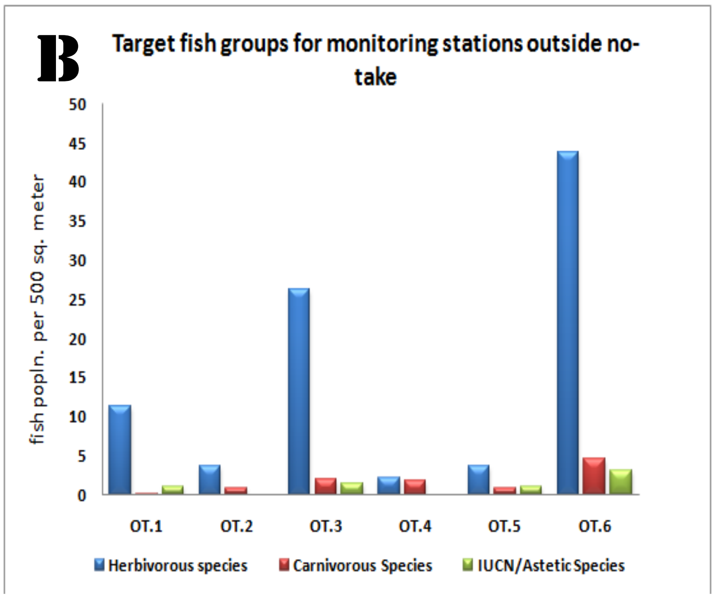


Looking at the general percentage of live coral cover for monitoring sites inside and outside no-take, it is apparent that no-take monitoring stations contained low live coral cover (29.3%) than dead coral substrate (70.7%). Monitoring stations for reefs outside no-take showed high live coral cover with 57.4% live corals and 42.6% dead, abiotic substrate.

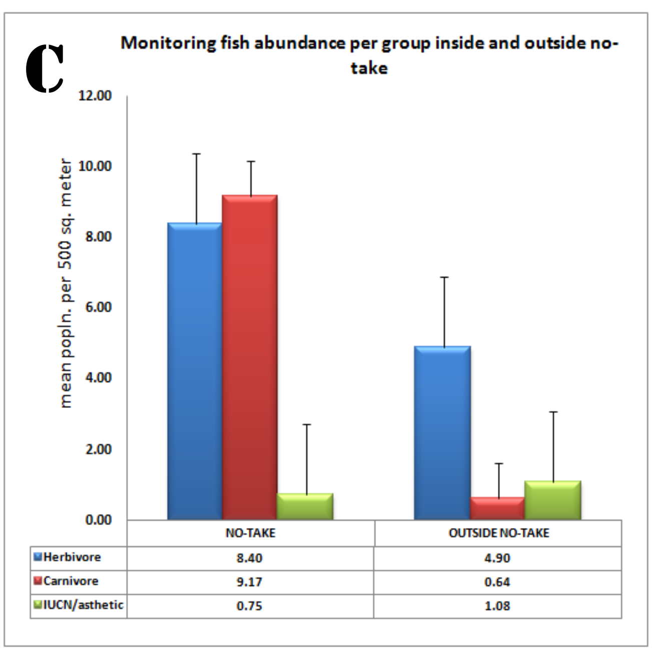
3.2. REEF FISH INDICATORS INSIDE & OUTSIDE NO-TAKE AREAS



Data for target fish groups inside 6 monitoring stations clearly showed that Tawali Namonamo (NT.1) recorded the highest average for herbivore fishes (13.4 fish per 500m^2 sampling transact) and carnivore fishes recorded an average of (14.5 fish per 500m^2 area). Second highest record for fish was at Banibani Siga (NT.6) with an average record of 12.5 herbivore and 13.17 carnivore fishes per 500m^2 transact. Meanwhile, the other area with high average counts includes Siasialina with averages of 11 herbivore and 12 carnivores. Monitoring site that recorded the lowest fish assemblage in this monitoring period was Hanakubakuba Island with averages of (1.57 for herbivore and 1.83 for carnivore). In general, records for IUCN listed species and that of aesthetic value was significantly low in all monitoring stations however; Banibani Siga (NT.6) was the only site to record and average of 2.5 fish 500m^2 assessment areas.



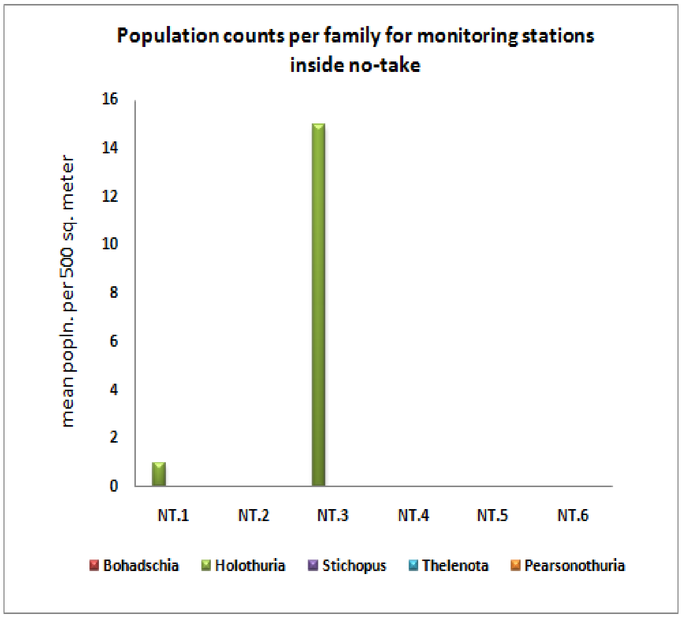
Abundance of target monitoring fishes in the monitoring stations outside of the no-take zones showed low representation of carnivores and IUCN/aesthetic species. Meanwhile, average population counts for reef herbivores were the highest at Tawali Balabala (NT.6) recording 43.7 fishes per 500m^2 sampling area. Second to this was SE Pahilele monitoring area, recording an average of 26.8 herbivore fishes per 500m^2 sampling area. Thus, average population counts for carnivore fishes were low with its high record being at 4.5 fish per 500m^2 sampling transact.



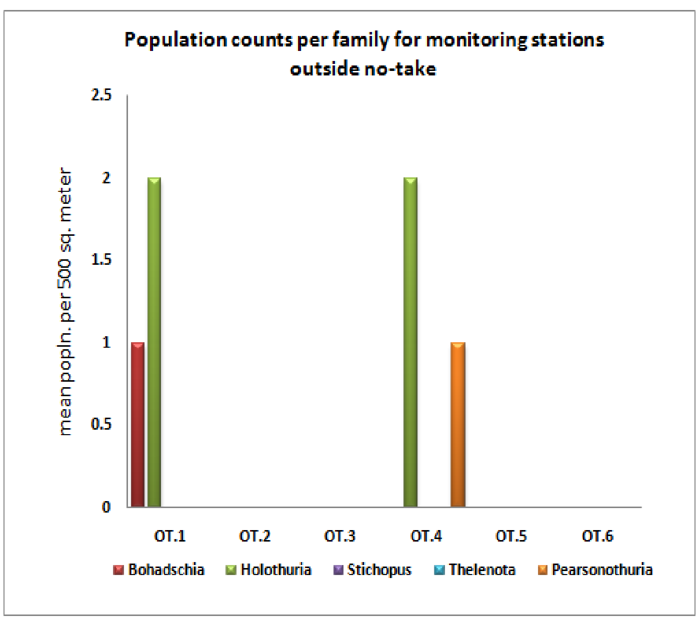
The graph of target fish species inside and outside no-take clearly illustrate that no-take sites houses more reef fishes than those area outside no-take. The mean counts for herbivore fishes inside the 6 no-take stations was 8.4 fishes per 500m^2 of each stations while the population of reef carnivores amount to 9.2 fishes per each studied sites. Monitoring stations outside no-take zones recorded an average value of 4.9 herbivore fishes 500m^2 sampling transact and 0.64 carnivore fishes per each 500m^2 sampling transacts.

MARINE INVERTEBRATES

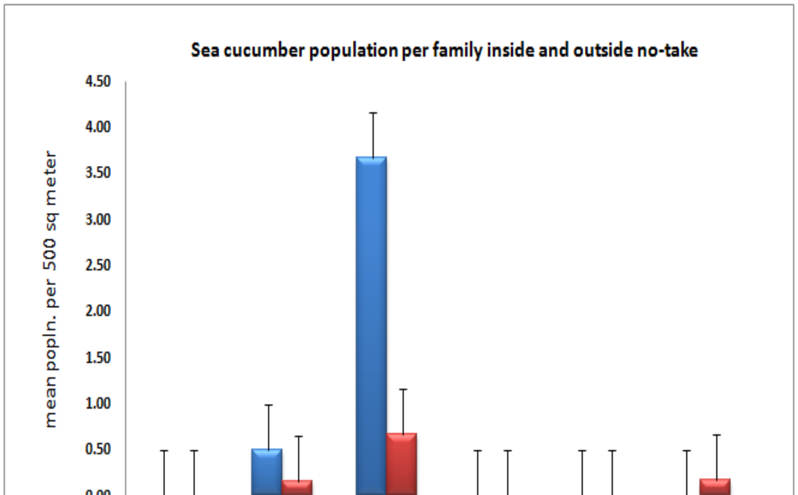
3.2.1. Sea cucumber population in no-take sites and in sites outside no-take



Distribution and abundance of sea cucumber for 6 monitoring stations inside no-take clearly shows that sea cucumber family Holothuria was the only group to record high abundance, having 15 individuals. Lollyfish (*Holothuria atra*) was the common species recorded at Dana Gedu (NT.3). Tawali Namonamo recorded 1 sea cucumber of the family Bohadschia. All other sea cucumber was not recorded in any of the other monitoring stations inside no-take areas.



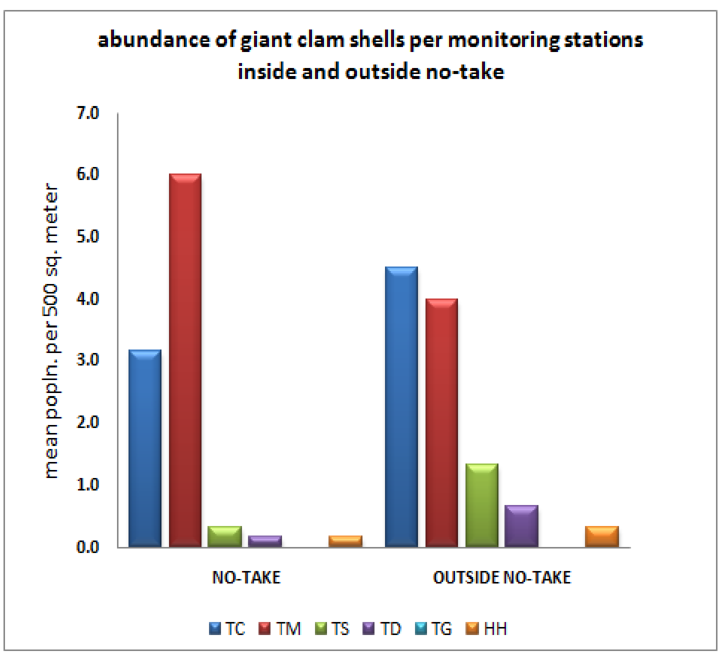
Areas outside no-take showed a similar pattern to those inside no-take. 2 individuals of Holothuria and 1 individual from Bohadschia were recorded inside the 500m^2 sampling transact for the northwestern fringing reef of Iabam Island (OT.1). Tawali Balabala (OT.4) recorded 2 sea cucumbers from Holothuria family, and 1 species from Pearsonothuria (i.e. *Pearsonothuria graeffei*). All other monitoring transacts had no record for any sea cucumber.



	Actinoppygra	Bohadschia	Holothuria	Stichopus	Thelenota	Pearsonothuria
inside no-take	0.00	0.50	3.67	0.00	0.00	0.00
outside no-take	0.00	0.16	0.67	0.00	0.00	0.17

Combining data for sea cucumber found inside no-take and outside no-take the average from family Holothuria appeared holothurians to be more distributed inside no-take monitoring areas with 3.67 holothurians per 500m^2 sampling area. Holothuria, Bohadschia and Pearsonothuria families appeared to be more distributed in reefs outside no-take area. The average population were 1.67 (Holothuria), 0.16 (Bohadschia) and 0.17 (Pearsonothuria) per 500m^2 of each monitoring stations outside of no-take.

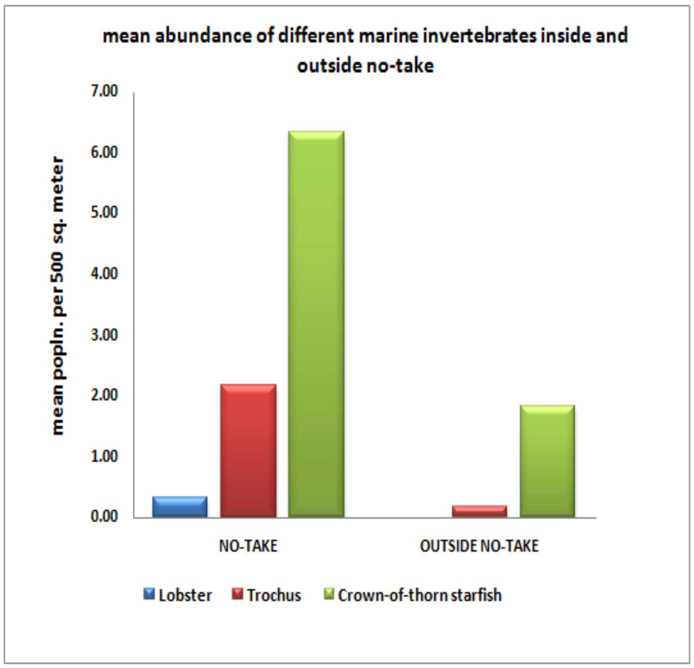
3.2.2. Distribution of giant clam inside no-take and in areas outside no-take



This graph combines all data for the 6 common clam shells found at each monitoring transacts both inside and outside no-take areas and provides averages for each species occurrences. Data from no-take monitoring stations clearly show that TM was the dominant species with an average of 6.0 species per 500m^2 sampled. TC was the other species having 3.17 individuals per 500m^2 transact. Other 3 species showed low averages with TS averaging 0.33, HH with average of 0.17 and TG with no record in anyone of the monitoring areas.

Data for reefs outside no-take show a similar trend with high TC presence followed by TM and TS. Thus, number of TC was recorded highest in sites outside no-take while TM showed high dominance in sites inside no-take.

3.2.3. Other marine invertebrates (lobster, sea starfish, trochus, crown-of-thorns)



Other marine invertebrates like lobster, trochus and crown-of-thorn starfish data showed that average record for lobster inside no-take monitoring stations was 0.33 per 500m^2 sampling area while stations outside no-take did not record any lobster. Mean values for trochus inside no-take was 2.17 individuals per 500m^2 where, 7 counts were made at Hanakubakuba (NT.5), 3 counts at Tawali Namonamo (NT.1) and Banibani Siga (NT.6) respectively. 1 individual sighting was recorded at the southeastern fringing reef of Iabam Island. Records for crown-of-thorn starfish inside no-take showed an average of 6.33 individuals per 500m2 sampling area for 6 no-take monitoring stations. Many of the records originated from Dana Gedu (NT.3), recording 28 individuals inside its monitoring area of 500m^2. Second to this was Banibani Siga (NT.6) with 8 counts per 500m^2 monitoring area, and Tawali Namonamo (NT.1) with 1 record in its monitoring area. On average, the no-take areas have a mean of 1.83 individuals per 500m^2 for all 6 stations, thus, sites with the highest record was Kiwakiwalina (OT.6), recording 10 individuals inside its 500m2 of study.

4. DISCUSSION

4.1. Benthic substrate

There has not been much change in the percentage of live coral cover over the last 3 months. Reefs outside no-take *(OT monitoring stations)* continue to have high coral cover *(both hard and soft)* than many sites inside no-take *(NT monitoring stations)*. Main reasons for these have been explained in section 4.1 of March report by Solipo and Wangunu (2011). Some interesting observations made during this monitoring include high settlement and growth of new coral colonies. Many of the sites inside the no-take showed evidences of new branching coral and massive coral larvae settlement and early growth characteristics. These new coral settlement indicates larval supply from outside sources. A detailed and more scientific study can only confirm that this is truly happening and to establish sources from where these new coral larvae are coming from.

Another important reef characteristic that has never been described and explained in previous reports is "reef complexity". Reef complexity basically describes how much habitat a reef can provide as a result of its geological formation and the amount of different coral morphologies *(type)* found on that reef. For instance, a reef with a lot of rock holes or crevices, large type branching corals and many types of corals provides diverse habitats for different kinds of reef fishes. In addition, a reef with rock crevices shall provide good habitat for large groupers; reef with a lot of branching corals will provide good habitat for coral trout and many reef fishes including Bilawa while reefs with flat rocky substrate, seagrass and macroalgae provides good habitat for herbivore fishes like surgeonfishes and rabbitfishes. A large area of sand patch could be described as low complex habitat which will not support any organisms.

Fig 2 . Examples of 3 levels of reef complexities. First picture shows a very low complex type reef. Center is an intermediate reef with medium complexity and right shows a multi habitat high complex reef system.

Many reefs surrounding Iabam and Pahilele Islands are of high and low complexities. For example, Tawali Balabala (OT.6) has high complexity as a result of large coral growth while Tawali Namonamo (NT.1) could be described as low complexed reef because of one or two kinds of habitats which in our monitoring we found hard bedrock substratum, patches of dead coral rubble and isolated colonies of live coral. Furthermore, a lot of scientific information have always illustrated that reefs with high complexity often accommodate aggregations of fishes, marine invertebrates and many other organisms than reefs with low complexity.

4.2. Reef Fish

Fish data in this June monitoring showed changes in sites recording high counts of target monitoring species. In this survey, Tawali Namonamo (NT.1) recorded high averages for herbivore fishes (13.4) and carnivore (14.5) fishes per 500 m^2 studied area while the March survey showed that Luluwalagena (NT.2) recorded high fish counts with averages of 14 herbivore and carnivore fishes in the sampling area of 500m^2. Many explanations could be provided for this phenomenal shift. Considering habitat complexity, NT1. had the lowest habitat complexity among all NT areas and the fact that populations for herbivore and carnivore fishes was high would require a separate study to determine the causes. In situ observations conclude that these results could be attributed to change of tidal patterns as a result of shift from northwest monsoon winds to southeast trade winds and a lot of food supplied by the tidal shift. Other reefs inside no-take with high counts remain unchanged when we compare each site's fish population for March and June. Siasialina (NT.4) being the furthest barrier reef continued to have high averages, recording 11 herbivore and 12 carnivore fishes within its 500m^2 sampling station. Banibani Siga recorded second highest counts in this current survey with averages of 12.5 herbivore and 13.7 carnivore fishes per 500m^2 which is a little more than what it recorded in March.

Fish counts for target monitoring species outside no-take clearly indicate high abundance of herbivore fishes than carnivore fishes with Tawali Balabala (OT.6) recording an average of 43.7 per 500m^2, pursued by southeast fringing reef off Iabam Island (OT.2) with averages of 26.8 fishes per 500m^2. All other monitoring sites recorded low population counts for herbivore, carnivore and IUCN Redlisted Maori wrasse and aesthetic species. When we compare our no-take with areas outside no-take (i.e. NT vs. OT) we can clearly see that there are a lot more reef fishes inside no-take than outside no-take.

Fish size was of some concern for many herbivore and carnivore fishes in areas inside no-take and areas outside no-take. Sizes for many species were smaller than their expected sizes. As mentioned by Solipo and Wangunu (2011), many large predatory fishes like sweetlips, coral trout and snappers were not recorded. Many fish recorded were in the size range of 20-30cm for herbivore species and 30-40cm for carnivore fishes. Having said that, there were carnivore species of sizes over 50cm in some reefs around Iabam and Pahilele. Examples of these were High fin coral trout *(Plectropomus oligacanthus)*, Yellow edge-lyre tail trout *(Variola louti)* and lined sweetlips *(Plectorhinchus lineatus)*.

Other observations on many of the reefs with monitoring stations clearly illustrate healthy population of large sized pelagic fishes. Some of the commonly sighted species in many reef edges and reef wall include; Skipjack tuna, Spanish Mackerel, Dogtooth Tuna, Rainbow runner, schools of fusiliers, Bluefin travally, Barracuda, Striped Mackerel and many small pelagic species like Mackerel Scads and Oxeye scads. This high abundance demonstrated high pelagic food source for the people of Iabam and Pahilele Islands.

4.3. Sea Cucumber

Information on sea cucumber from shallow transacts showed very low population for all species. Owing to the long term sea cucumber fishery in the province, many species have been exploited to a level where some species can face local extinction if no management control is put in place. Distribution patterns shown from the three monitoring program illustrate presence of certain individuals in only a few family groups. Presented in section 3.2.1 graphs A, B and C is records for Holothuria, Bohadschia and Pearsonothuria recorded inside no-take reefs while families like Actinopygra, Stichopus and Thelonata had no record in any monitoring stations inside and outside no-take. Sea cucumber from Holothuria family continued to dominate many of the reefs around Iabam and Pahilele Island. Other sea cucumber families not recorded could be on the reefs but maybe outside the monitoring stations therefore, were not recorded. Thus, all families may have representative species in either deeper water and/or might have gone hiding as a result of their nocturnal feeding behavior therefore; were not observed during daylight hours when this monitoring was conducted. A general statement of fact based on the monitoring data and previous deepwater monitoring show very low population of all sea cucumber families though it was evident that juveniles from some species were found in many reef areas indicating stock recruitment, more time and conservation effort is required to further enhance recruitment and growth of these new recruits into brood stock stage.

4.4. Clam Shell

Distribution of giant clams is determined by substrate type and environment conditions surrounding each reef systems. Thus, habitats such as those on mainland fringing reefs and bays with little influence of oceanic conditions and areas with high rocky substratum usually provide suitable habitats for TC and TM clam shells. TD, TS and TG grow best in habitats with less sediment and in areas with high saline conditions.

As a matter of fact, out monitoring data clearly illustrates this. Records for TC were highest at the mainland fringing reefs with averages of 4.5 per 500m2. Large contribution for this was at NW Iabam fringing reef (OT.1) recording 14 counts in its monitoring area. Many other reefs including barrier and patch reefs showed low population counts however, recorded high figures for maxima clam (TM). Most outer reefs managed as NT zones recorded an average of 5.83 clams per monitoring area where NT.2, NT.5 and NT.6 all recorded 7 TM inside their monitoring transact.

Other species like scaly clam (TS), smooth giant calm (TD), giant clam (TG) and bear paw clam (HH) also have individual recorded for some areas inside no-take and outside no-take areas. Furthermore, there were also observations of these clams found outside the monitoring stations which indicate that their population is not as low as it shows in our monitoring data.

4.5. Other invertebrates *(Lobster, trochus, crown of thorn starfish & starfish)*

Records for lobster were very low despite the fact that average counts for no-take was 0.33 per $500m^2$. Monitoring stations outside no-take showed no record for any lobster species in all its 6 monitoring areas. The low counts we saw can be explained in a number of different ways. An obvious conclusion at this stage is that they have been intense fishing pressure on its population over the last two decades which would have led to sparse population distribution observed today. Although many sites showed to be of suitable habitats, some of these suitable habitats did not record any species at all. Scientific studied have shown that lobsters often aggregate in small groups forming family units on different reefs thereby, sighting of one individual would always mean that others can also be found within close proximity. A second factor that could have contributed to the record gathered in this monitoring would be related to the animal's nocturnal feeding behavior. Many lobsters often feed at night and rest during daylight hours therefore much was not recorded in any of the sites we sampled. It is therefore apparent that unless some of our monitoring is tailored toward night sampling then we will not fully understand their local behavior on our reefs.

Population for trochus shells was also low in many monitoring stations. This monitoring period recorded an average of 2.17 trochus per 500m2 meaning, on average you would expect to see 2 trochus in any no-take areas. This assumption may not always be true but is based on averages taken for each representative sampling area. Further explanations for this is not possible at this stage but could be provided later through detail survey/assessment.

Crown of thorn starfish (COT) population continue to be a worry for many healthy reefs. Records for this survey show high abundance at Dana Gedu (NT.3) where the sampling area recorded 28 COT. It was also observed that sites with high staghorn corals or branching corals also recorded high numbers of COT. COT abundance showed preferences and a linear relationship with the distribution and abundance of staghorn corals. Further population control strategies and appropriate actions shall be investigated and proposed for implementation in December after we reconfirm their population again in the coming September monitoring.

5. REFERENCE

Bellwood R. D. Hugh P. T and Hoey, S.A (2006). Sleeping Functional Groups dives coral reef recovery. Current Biology 16: 2434 – 2439

Jones G.P., Srinivasan M., Almany G.R (2007). Population Connectivity and Conservation of Marine Biodiversity. Oceanography Vol.20. No. 3.

Kelleher G & Kenchington R.A. (1992) Guidelines for establishing marine protected areas. IUCN. Great Barrier Reef Marine Park Authority

Lieske E and Myers R (2001). Coral Reef Fishes. Indo-Pacific and Caribbean. Princeton University Press. 400pp.

Solipo J. and Wangunu N. (2011). Iabam-Pahilele Community Based Resource Monitoring Program. Survey Report 2. March 2011. NIPCMMA. 13pp

Wangunu N (2010). Community based reef monitoring for Nuakata and Iabam-Pahilele Community Managed Marine Areas (NIPCMMA). Conservation International 32pp.

Wangunu N (2009). Analysis of target marine ecological indicators and documentation of tides and sea surface currents inside Nuakata and Iabam-Pahilele CMMA. Conservation International. 25pp

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